

# Windhover Unmanned Aircraft Systems (UAS) Software Ecosystem, Phase II

Completed Technology Project (2017 - 2018)



## Project Introduction

The safety of Unmanned Aircraft Systems (UAS) flights is currently the responsibility of the pilot who is required to keep the vehicle within their line of sight (LoS). However, many UASs are capable of increasingly autonomous operation. As autonomy pushes against this boundary it is inevitable that the LoS requirement must be replaced with onboard intelligence to sense and avoid trouble without pilot intervention. The software making these decisions must be developed and tested to standards that ensure reliability and safety. Robust development, test, and operations tools will ensure quality development, adequate testing, and insightful operations of UASs. Windhover proposes to build upon their Phase I efforts to create a complete ecosystem of flight and ground software, as well as processes and standards for achieving the levels safety needed for operations of small UASs. The newest UAS operators are solving problems in their respective industries. They need a robust UAS software development tool chain that provides access to vehicle control in a safe manner that their existing IT resources and software personnel are already familiar with. Application developers building on the Windhover infrastructure use the entire tool chain to create robust test campaigns. The onboard test agent and ground automation provide a rich scripting environment that facilitates the efficient creation of multi-level test campaigns for verification and validation. These application test campaigns are built upon the pedigree of the Windhover framework that has been developed and tested with the same tool chain. Our Windhover software ecosystem will enable an exponential rate of innovation in the UAS software market and lead to novel solutions to the problems facing the integration of small UASs into the National Airspace (NAS). The Windhover ecosystem will become the defacto standard for safely developing, testing, deploying, and operating UAS applications in the NAS.



Windhover Unmanned Aircraft Systems (UAS) Software Ecosystem, Phase II Briefing Chart Image

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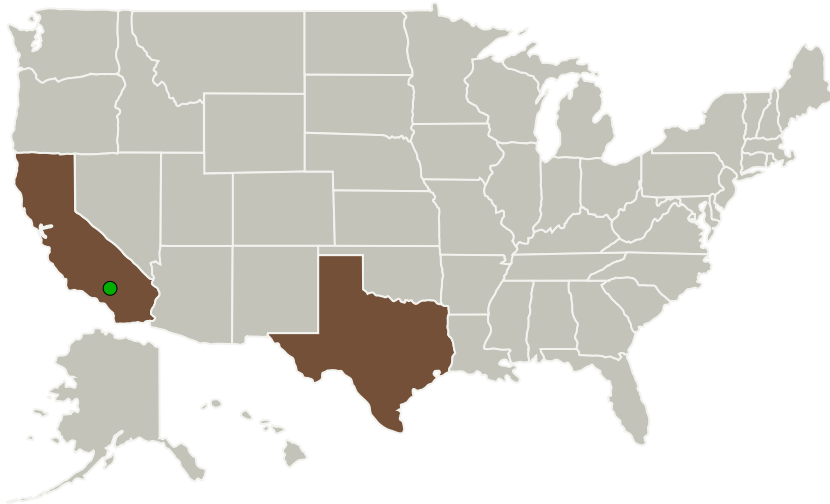
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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Windhover Labs	Lead Organization	Industry Veteran-Owned Small Business (VOSB)	League City, Texas
● Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California

## Primary U.S. Work Locations

California	Texas
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## Project Transitions

**June 2017:** Project Start**June 2018:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140833>)

Organizational  
Responsibility**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Windhover Labs

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

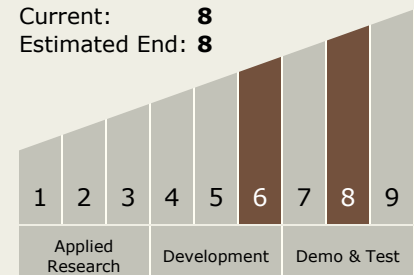
Carlos Torrez

**Principal Investigator:**

Mathew Benson

Technology Maturity  
(TRL)

Start: 6  
Current: 8  
Estimated End: 8



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## Images



### Briefing Chart Image

Windhover Unmanned Aircraft  
Systems (UAS) Software

Ecosystem, Phase II Briefing Chart  
Image

(<https://techport.nasa.gov/image/135814>)

## Technology Areas

### Primary:

- TX10 Autonomous Systems
  - └ TX10.2 Reasoning and Acting
  - └ TX10.2.4 Execution and Control

## Target Destinations

The Sun, Earth, The Moon,  
Mars, Others Inside the Solar  
System, Outside the Solar  
System